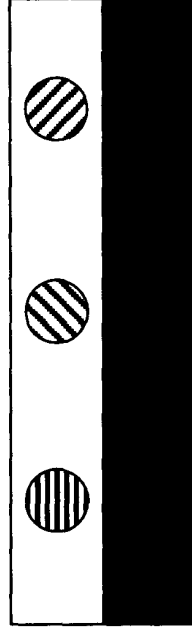


Prior Art 1

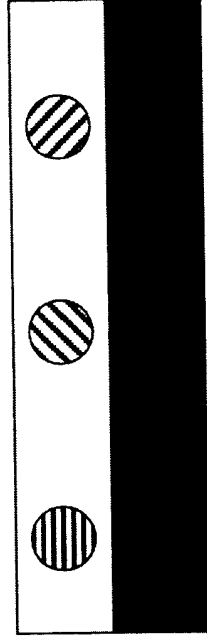
Surface
← Figure 1a



Fluid layer containing
micro-spheres, gelling agent and
chemical cross-linking agent
spread over surface.

Figure 1b

Gelling agent
undergoes physical
gelation
Figure 1c

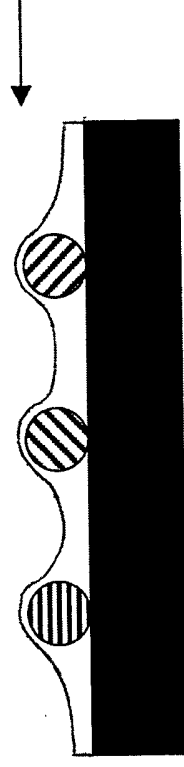


Water evaporated
from bead layer
Figure 1d

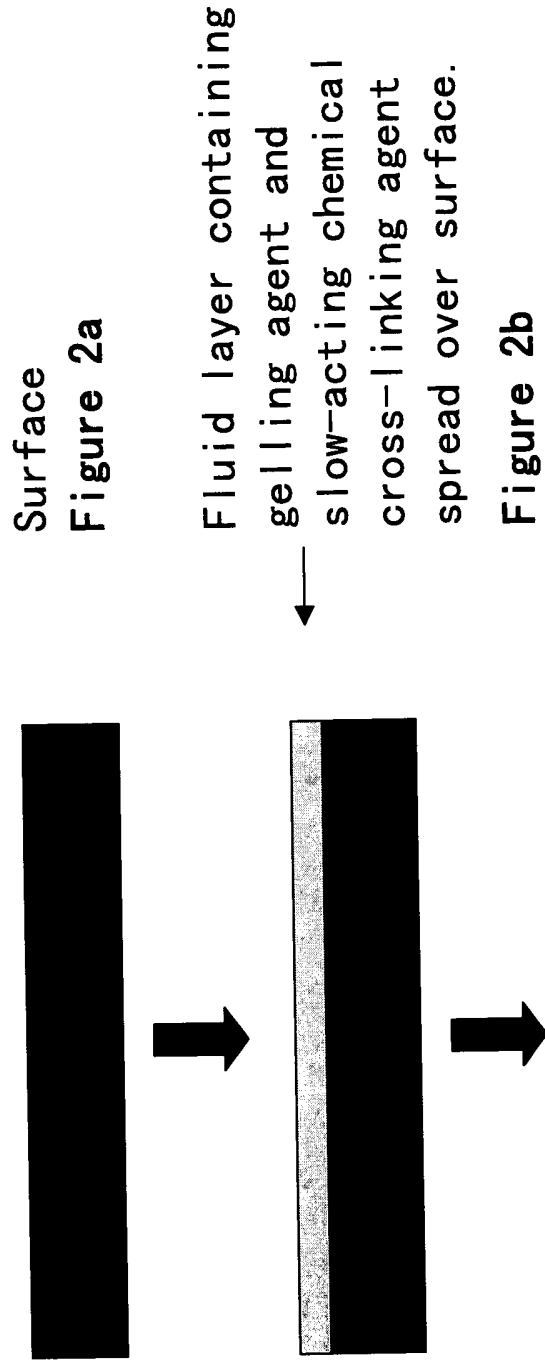


Cross-linking
reaction goes to
completion to
permanently fix
beads in the array

Figure 1e.

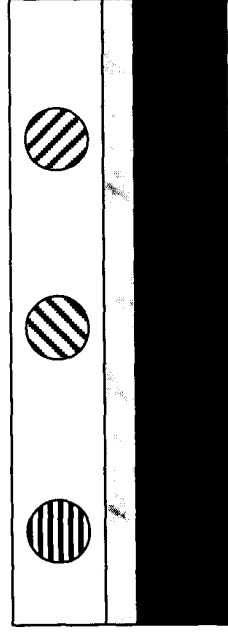


Prior Art 2



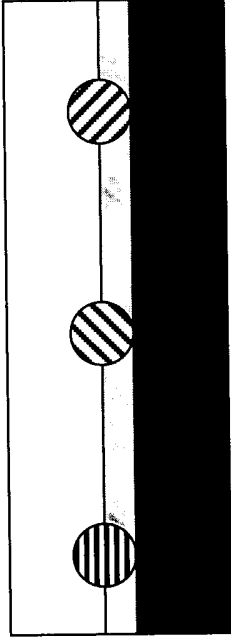


Dissolution and
re-deposition of polymer
on bead surface

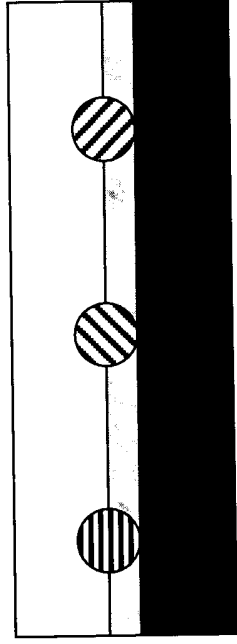


Aqueous bead layer applied
on top of un-cross-linked
fluid gel layer
Figure 2c

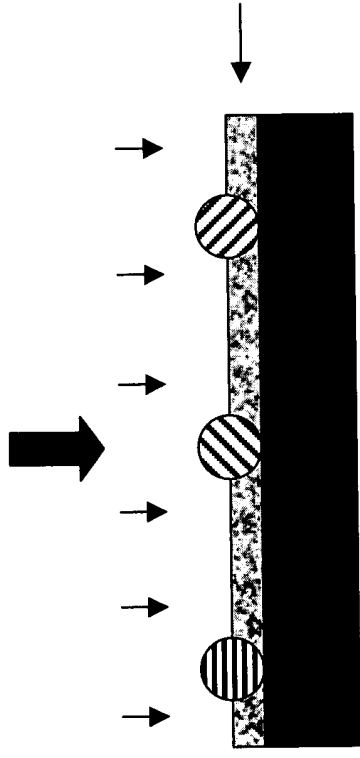




Beads submerge
into gel layer due to a
gravitational and van der
Waals forces
Figure 2d



Water is evaporated from
the top layer to expose the
surface of the beads
Figure 2e



Chemical cross-linking reaction
allowed to go to completion in
order to permanently fix the beads
Figure 2f

Invention 1



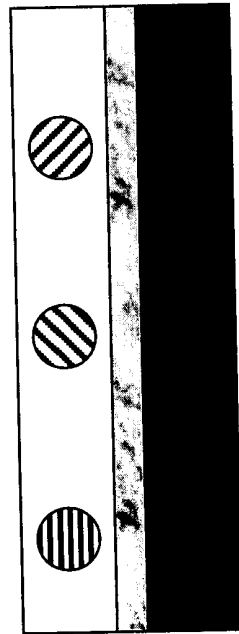
Surface
Figure 3a



Fluid layer containing
gelling agent and slow-acting
chemical cross-linking agent
spread over surface.

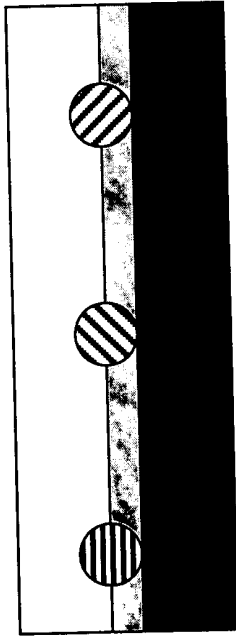


Gelling agent undergoes physical
gelation. Cross-link density
and elastic modulus adjusted to per
indentation by micro-spheres.
Figure 3c

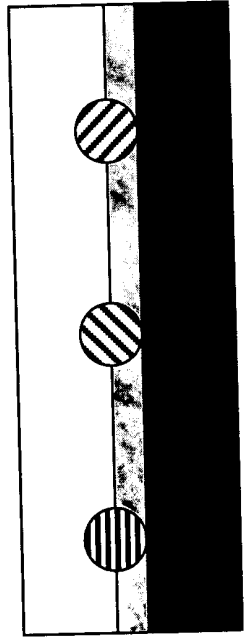


Aqueous bead layer applied
on top of gel layer
Figure 3d

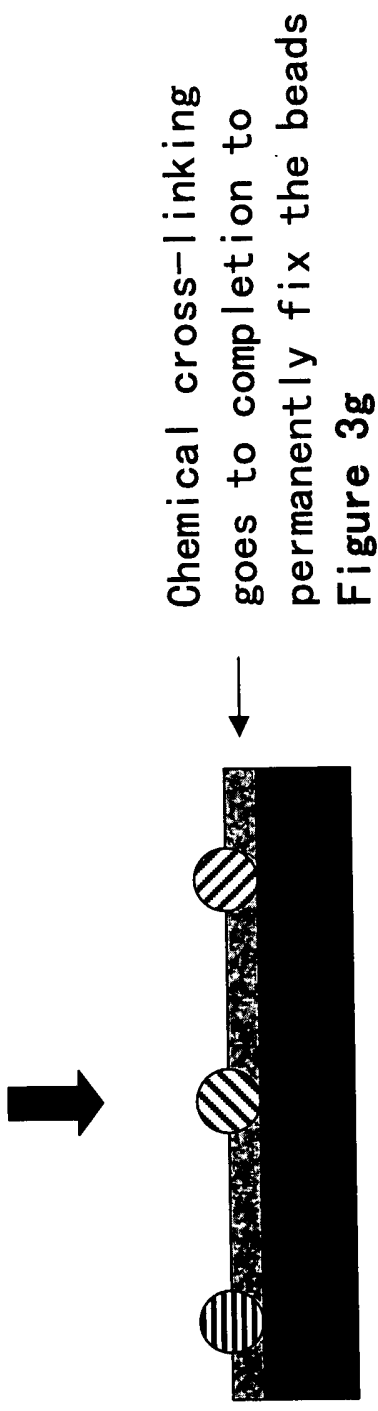




Beads partially submerge
into gel layer due to a
gravitational and van der
Waals forces
Figure 3e



Water is evaporated from
the top layer to expose the
surface of the beads
Figure 3f



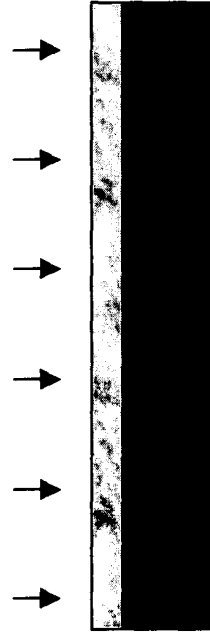
Invention 2



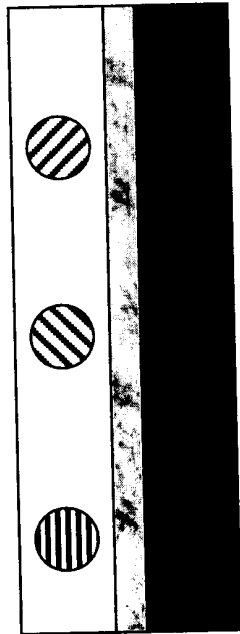
Surface
Figure 4a



Fluid layer containing
gelling agent spread over surface.
Figure 4b

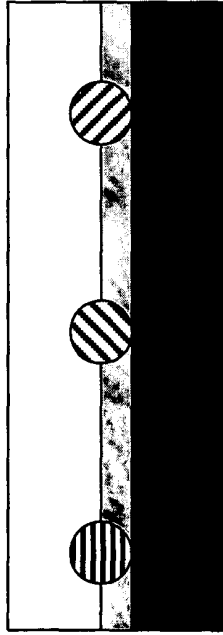


Gelling agent undergoes
gelation by UV irradiation.
Cross-link density and elastic modulus
adjusted to permit
indentation by micro-spheres.
Figure 4c



Aqueous bead layer applied
on top of gel layer
Figure 4d

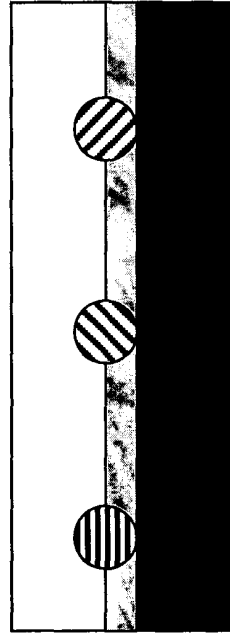




Beads partially submerge
into gel layer due to a
gravitational and van der
Waals forces



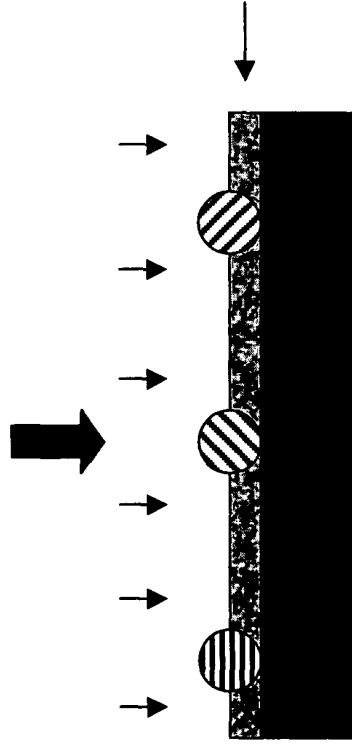
Figure 4e



Water is evaporated from
the top layer to expose the
surface of the beads

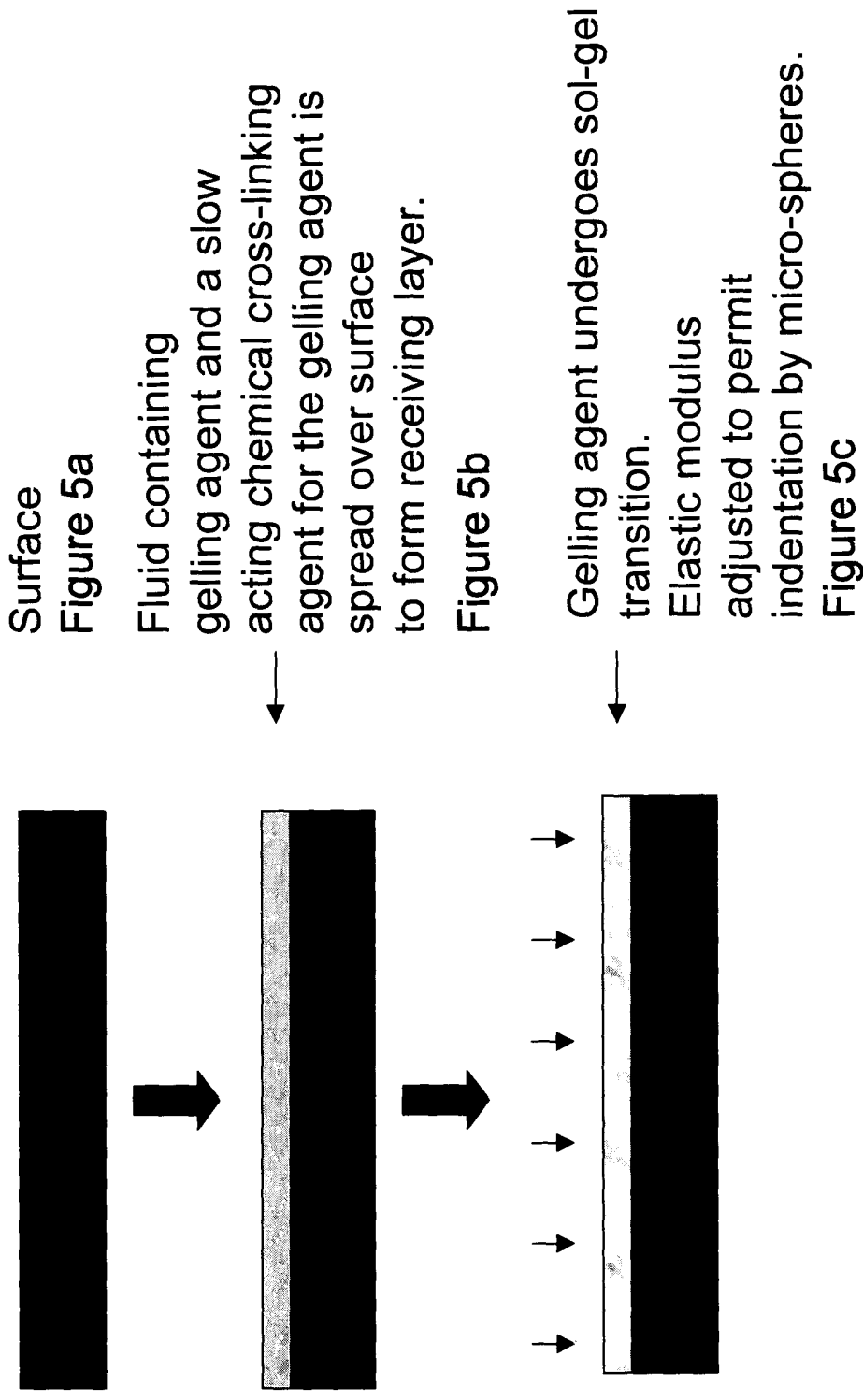


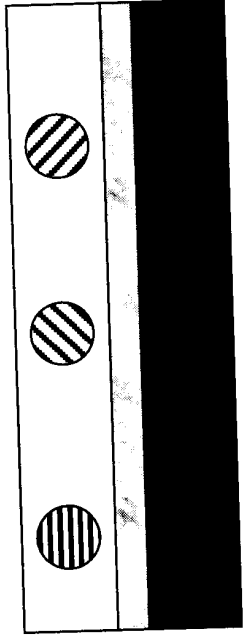
Figure 4f



Additional UV irradiation to
increase cross-link density in
order to permanently fix the beads
Figure 4g

Invention 3

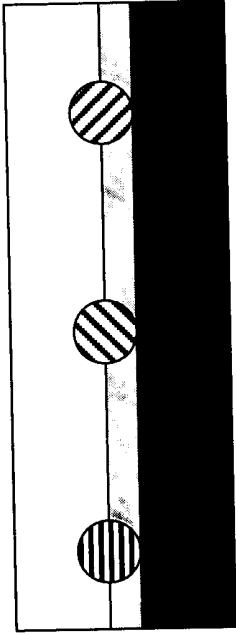




Aqueous bead layer at a temperature lower than the sol-gel transition temperature of the gelling agent is applied on top of cross-linked receiving layer.

Figure 5d

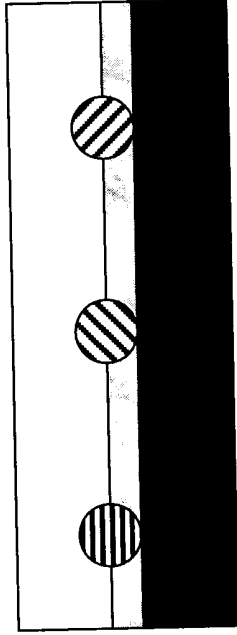




Beads partially submerge
into receiving layer due to
gravitational and van der
Waals forces



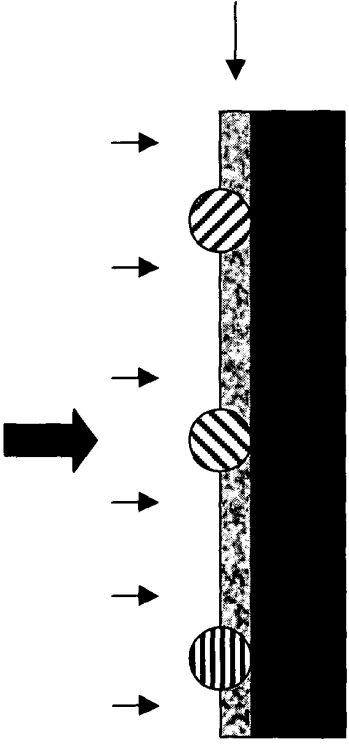
Figure 5e



Water is evaporated from
the top layer to expose the
surface of the beads



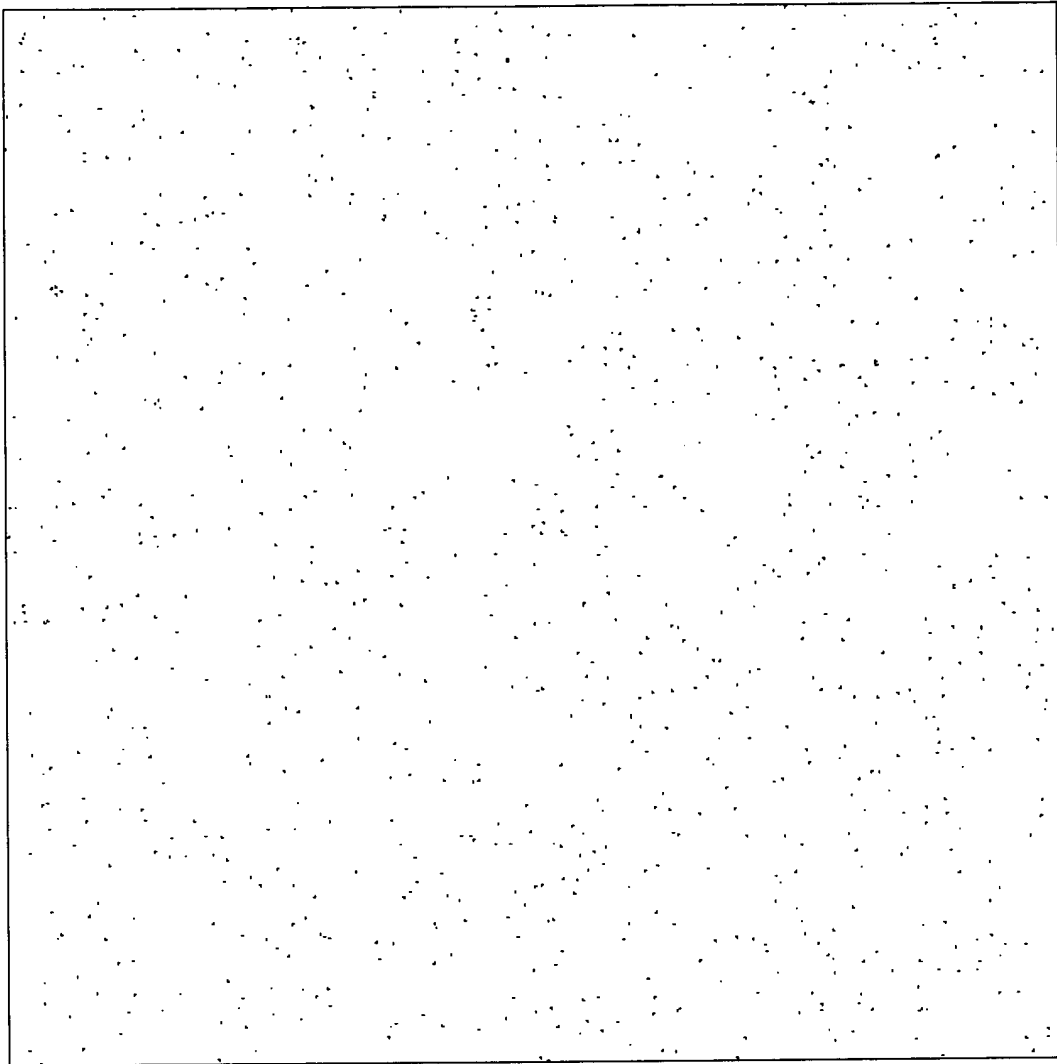
Figure 5f



Chemical cross-linking of
gelling agent goes to
completion to
render array robust
to wet processing.

Figure 5g

Fig. 6



no. of beads = 1000/sq.cm; particle dia = 10 microns

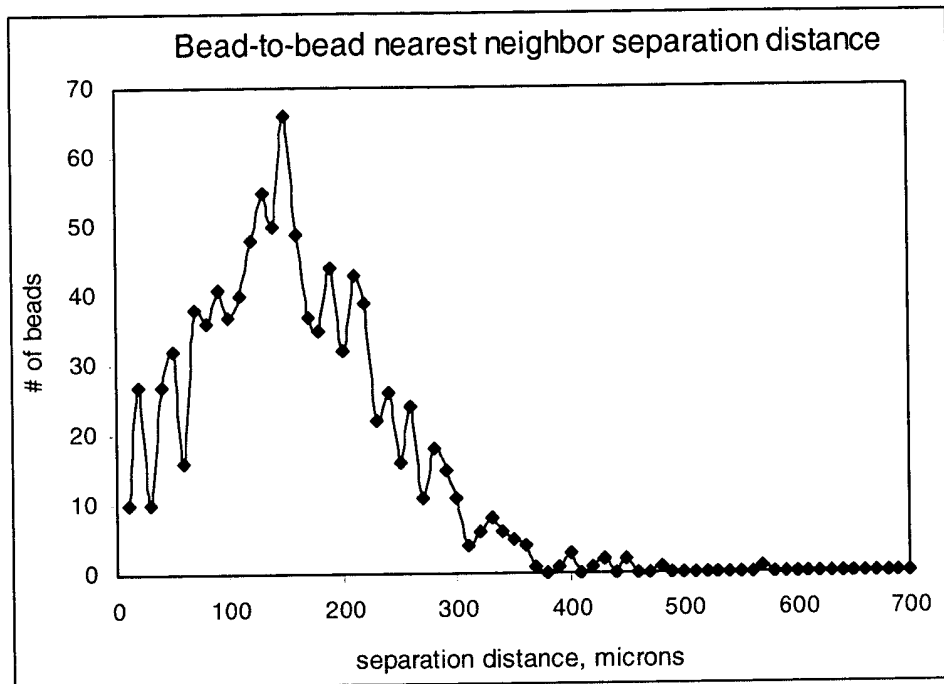


Fig. 7

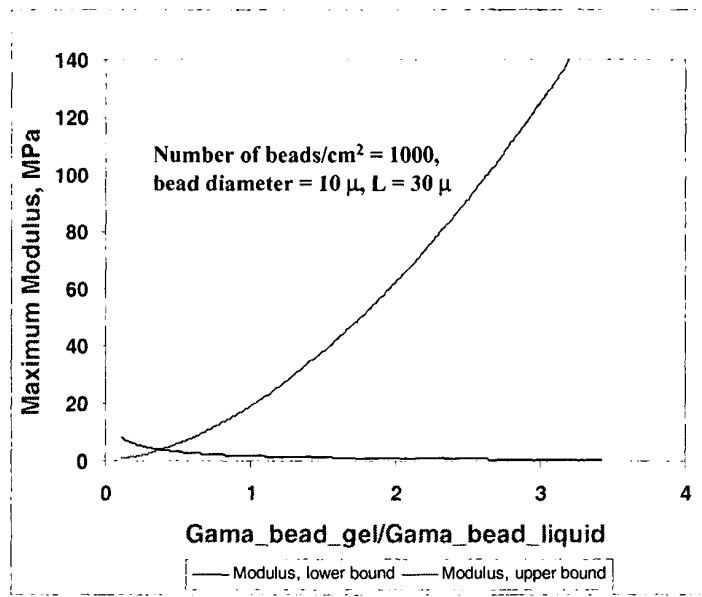


Figure 8. The lower and upper bounds of the feasible modulus is determined from the lower and upper curves.

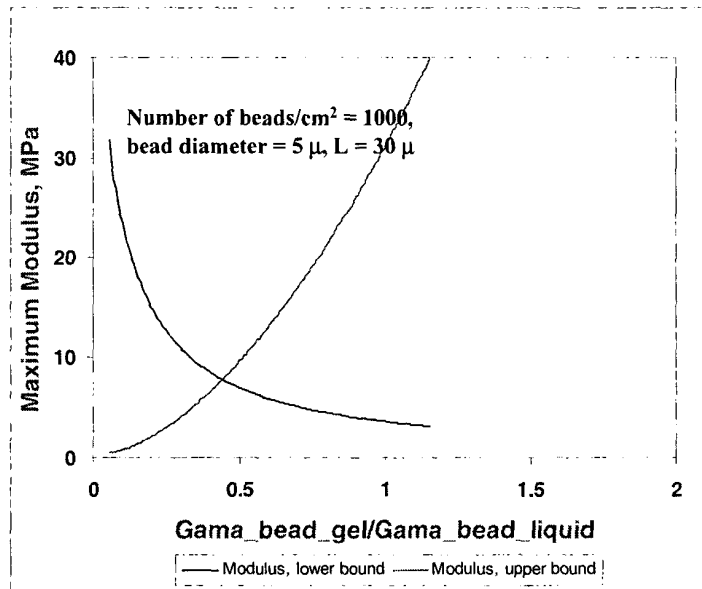


Figure 9. The lower and upper bounds of the feasible modulus is determined from the lower and upper curves.

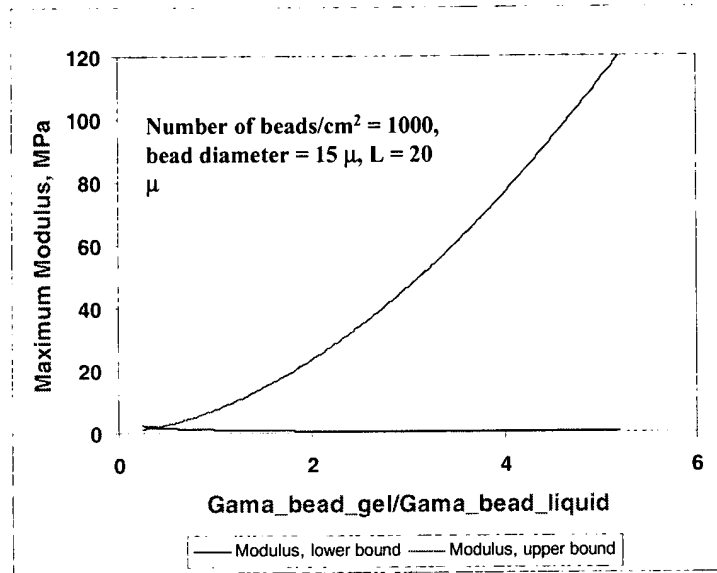


Figure 10. The lower and upper bounds of the feasible modulus is determined from the lower and upper curves.

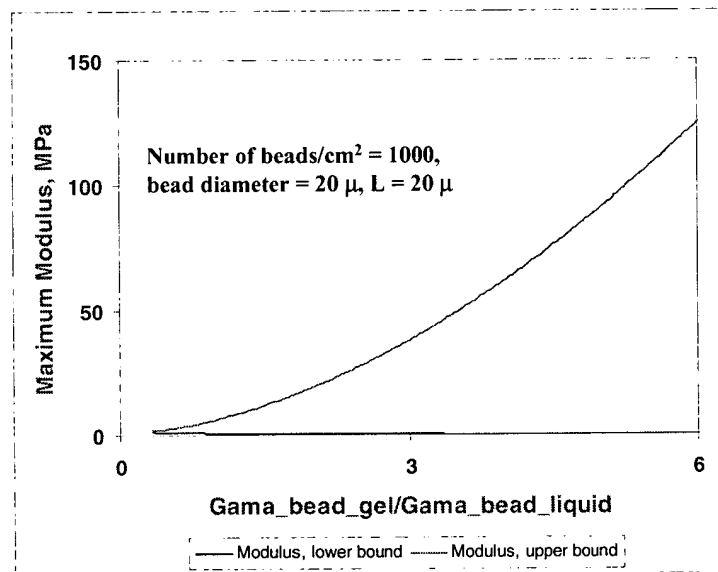


Figure 11. The lower and upper bounds of the feasible modulus is determined from the lower and upper curves.

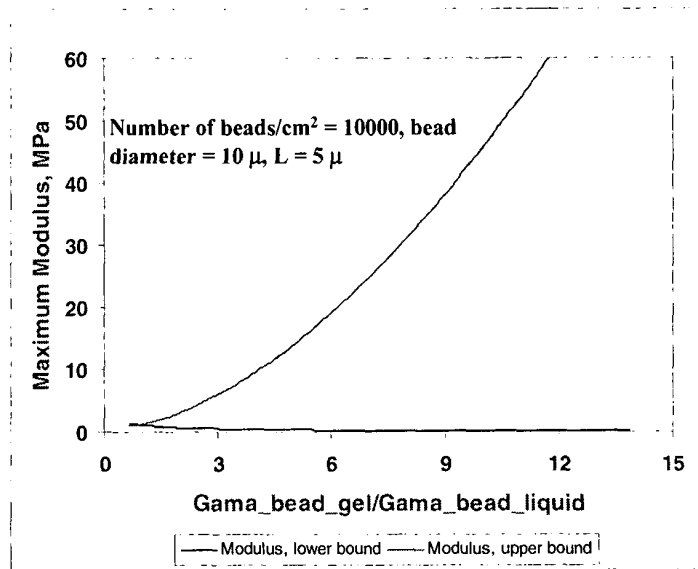


Figure 12. The lower and upper bounds of the feasible modulus is determined from the lower and upper curves.

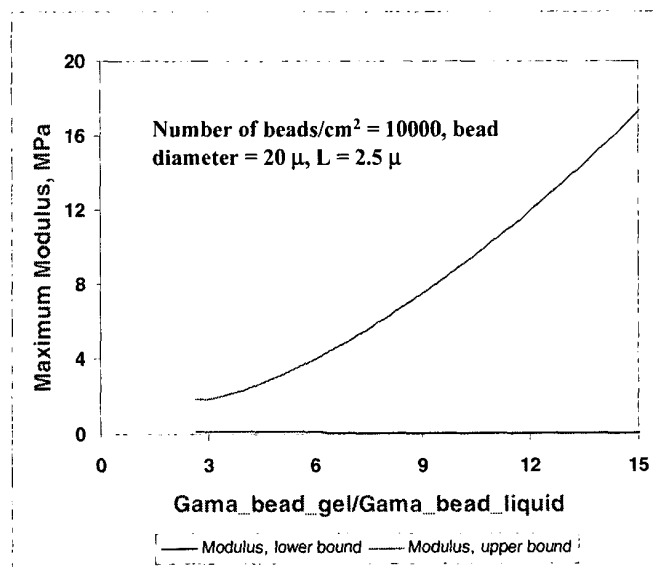


Figure 13. The lower and upper bounds of the feasible modulus is determined from the lower and upper curves.